What is claimed is:

1. A device for analyzing a test material, the device comprising:

a single radioactive source emitting radiation having Rayleigh scattered intensities that overlap with characteristic x-rays of the test material;

an energy detector for receiving fluoresced radiation from the test material; and

electronics coupled to the energy detector for determining the composition of the test material based at least upon the fluoresced radiation.

2. A device according to claim 1, wherein the electronics compensate for Rayleigh scattering.

3. A device according to claim 2, wherein the electronics compensate for Rayleigh scattering by subtracting the background radiation from the spectrum produced by the fluoresced radiation.

4. A device according to claim 3, wherein the electronics compensate for Rayleigh scattering by normalizing the spectrum produced by the fluoresced radiation using a pure metal standard spectrum.

5. A device according to claim 1 further comprising:

a shield for the radio active source isolating the detector from direct exposure to the x-rays and gamma rays of the radio active source.

6. A device according to claim 1, wherein the source is ^{241}Am.

7. A device according to claim 1, wherein the source is ^{239}Pu.

8. A device according to claim 6, wherein both the 59.5 keV and the 26.4 keV photons of the ^{241}Am source are used in determining the composition of the test material.

9. A device according to claim 6, wherein the 59.5 keV and the 26.4 keV gamma rays along with the L x-rays of the ^{241}Am source are used in determining the composition of the test material.

10. A device according to claim 1, wherein the test material is a metal alloy.

11. A device according to claim 1, wherein the test material is a precious metal.

12. A device according to claim 5, wherein the shield surrounds the

radioactive source except in the direction of the test material.

13. A device according to claim 1, wherein the radiation of the radioactive source interacts with a reactive material to produce photons which combine with the radiation of the source to increase the fluoresced radiation of the test material.

14. A device according to claim 5, wherein the reactive material is rhodium.

15. A method for analyzing a test material, the method comprising:

providing a single radioactive material emitting both x-rays and gamma rays, wherein the single radioactive material is ^{241}Am;

exposing the test material to the x-rays and gamma rays of the radioactive material;

receiving fluoresced radiation into an energy detector; and

determining the composition of the test material in a processor based in part upon the received fluoresced radiation from the x-rays and gamma rays of the ^{241}Am.

16. A method according to claim 15 further comprising:

accounting for the fluorescent background of the Compton and Rayleigh scattering.

17. A method according to claim 15, further comprising:

accounting for the fluorescent background of the Rayleigh scattering.

18. A method according to claim 15 wherein in determining the composition, a resulting spectrum of the fluoresced x-rays and gamma rays is analyzed to identify spectral peaks representative of elements found in the test material.

19. A method according to claim 15 further comprising: accounting for Rayleigh scattering by subtracting a pure-metal fluoresced spectrum from the fluoresced spectrum of the test material.

20. A method according to claim 19 wherein the pure-metal fluoresced spectrum is scaled before being subtracted.

21. A method according to claim 20 wherein the pure-metal fluoresced spectrum is scaled based upon a factor which is the ratio of a spectral line of the pure-metal fluoresced spectrum and a spectral line of the fluoresced spectrum of

the test material resulting from the source.

22. A method according to claim 15, wherein the test material is a metal alloy.

23. A method according to claim 15, wherein the test material is substantially a metal.

24. A method according to claim 23, wherein the metal is a precious metal.

25. A method according to claim 15, further comprising:

exposing the radio active source with a material fluoresced by photons emitted from the radioactive source which increases the fluoresced x-rays and gamma rays received by the energy detector.

26. A device according to claim 1, wherein the radioactive source is ring shaped and the energy detector resides within the ring.

27. A device according to claim 1, wherein the radioactive source is held in a ring shaped holder and the energy detector resides within the ring.

28. A method for analyzing a test material, the method comprising:

subjecting the test material to radiation produced by a single source, wherein the source has Rayleigh scattered intensities that overlap with characteristic x-rays of the test material;

measuring an energy spectrum of the fluoresced radiation of the test material in an energy detector;

compensating for the Rayleigh scattered intensities in the energy spectrum of the fluoresced radiation creating a compensated energy spectrum; and

determining the composition of the test material based upon the compensated energy spectrum.

29. The method according to claim 28, wherein the source is ^{241}Am.

30. The method according to claim 28, wherein the source is ^{239}Pu.

31. The method according to claim 28 wherein compensating includes:

calculating a normalization factor using a known Rayleigh scattering peak;

applying the normalization factor to an energy spectrum of a pure material; and

subtracting the energy spectrum of the pure material from the energy spectrum of the test material.

32. The method according to claim 31, wherein the known Rayleigh scattering peak is the result of the source material.

33. The method according to claim 32,wherein calculating a normalization factor includes: comparing the known Rayleigh scattering peak resulting from a pure metal to a comparable Rayleigh scattering peak of the test material.

34. The method according to claim 33, wherein the pure material is a metal.

35. The method according to claim 31 wherein the known Rayleigh scattering peak is the13.9 keV L_{α} peak of ^{241}Am.

36. A computer program product readable by a computer processor and having computer code thereon, for analyzing a test material, the computer code comprising:

computer code for receiving an energy spectrum of fluoresced radiation of the test material which is exposed to a single radiation source having Rayleigh scattered intensities that overlap with characteristic x-rays of the test material;

computer code for compensating for the Rayleigh scattered intensities in the energy spectrum creating a compensated energy spectrum; and

computer code for determining the composition of the test material based upon the compensated energy spectrum.

37. A computer program product according to claim 36, wherein the computer code for compensating includes:

computer code for calculating a normalization factor using a known Rayleigh scattering peak of the source;

computer code for applying the normalization factor to an energy spectrum of a pure material; and

computer code for subtracting the energy spectrum of the pure material from the energy spectrum of the test material.

38. The computer program product according to claim 37,wherein the computer code for calculating a normalization factor includes: computer code for comparing the known Rayleigh scattering peak of the source to a comparable Rayleigh scattering peak of the pure material.